

~~10~~ Black (J. R.)

10

SANITARY SCIENCE.

✓
BY DR. J. R. BLACK, OF NEWARK, OHIO.

Read before the Ohio State Medical Society at
its Annual Meeting, at Cincinnati, O., 1871.





Sanitary Science.

BY DR. J. R. BLACK, OF NEWARK, OHIO.

Man's thoughts in his lowest mental state, move in a very limited circle. This circle thrown upon the widest sphere of thought of a day dwindles to a mere point—a point so small that astonishment might well be excited at the fact that intelligent beings can be content to think within it. From this small point man has advanced slowly upon the unknown, upon the wonders and mysteries above him, below him, and around him. Beyond his sphere of thought all is dark and dreadful; within it, thanks to the illuminating power of reason, there is light, more or less of it, to cheer and guide him. The illuminating power of the intellect does not move uniformly upon the ever widening circle of nature's mysteries; some giant gifted minds throwing light far into the darkness which environ it on every side, save on the point of advance. A number of such minds uniting in projecting knowledge in some special direction carries it far in advance of the general circle, when owing to the correlations and dependencies that exist among all its branches, a further advance is impossible until the darkness which envelops it to the right and left is dispelled. The light thrown in one direction upon the mysteries of natural phenomena, illumines collateral fields less or more, so that, while making search for the true explanation of one thing, another mystery in a related branch of knowledge for which no search was being

made is unexpectedly made plain. Thus it is that knowledge sought in some directions, is advanced by the force of genius, in others, it is advanced by light incidentally thrown upon it while seeking to understand another. In the latter category must we place *Sanitary Science*. Like medicine it has had no Galen or Harvey, like chemistry no Day, like astronomy no Copernicus or Newton. No brilliant intellects have brought sanitary science abreast, far less to the advance of sister branches of knowledge: what little progress has been recently made being mainly due to light thrown upon it while cultivating branches to which it is related. Let any one read "*Hufeland's Art of Prolonging*" life, written about a century ago, and he will be made aware how little real progress has been made in knowledge of the ways and means through which health is destroyed. Compare the information received to-day on chemistry, on physiology, on geology and on astronomy, with what it was a hundred years ago, and it will be at once apparent that school boys know more of these branches now, than scientific men did then; yet on the subject of hygiene even the grey haired physician of to-day may read Hufeland with profit.

A union of causes has served to keep this important branch of knowledge in such a state of backwardness. Foremost among them is the idea, long prevalent, of the enevitableness of the disease. It is assumed either that nature, or nature's God is inimical to man's healthy existence; and if one or the other is at war with our nature, knowledge will not avail us. If, for example, the processes of nature, or the wrath of the Deity every now and then send forth the agents of disease and death, I, with others, can see no more hope of the future than the past. But such a deadening fatalistic view, subversive as it is of all sense of responsibility for the evils which befall us, is fast passing away under the light of experience and advancing knowledge. The history of the past exhibits the fact that knowledge of the causes of disease has

progressed just as knowledge has in other branches of information. In this progression we may also discern an age corresponding to that of stone, of brass and iron; or more ^{conversely} oppositely, according to the physical arrangement of Draper, ⁱⁿ an age of superstition, an age of faith, and an age of reason. The age of superstition as to the origin of disease prevailed everywhere in primitive times, and is continued to this day among all savage peoples. They imagine all their disorders to come from some supernatural source, from evil spirits, evil eyes and from the anger of their gods. The Indian believes disease to be the work of an evil spirit, the equatorial African, that every sick man is bewitched, and when he dies, that the one who bewitched him must be instantly put to death, else there would be no safety for any one in the tribe.

Everywhere in ancient times, and at the present day among all barbarous nations the offices of priest and physician are united. This union had its source in the belief of the spiritual origin of disease. The pagans in times of danger from pestilence consulted the oracles and frequented, with offerings, the temples of Esculapius and Hygeia. Indeed it is eminently fit that if diseases arise from spiritual wickedness or sin, the work of their alleviation or cure should be entrusted to those consecrated as guides in spiritual matters. It was not until the beginning of the seventeenth century that the supernatural era began to give way, and the populace of any nation could be persuaded to take any other than spiritual measures to avert the destructive sweep of epidemics.

The sum of the precautions taken in London, whose squalidness and filth Erasmus and Macaulay so graphically depict, to guard against oft repeated visitations of the plague, was to isolate the houses of the stricken, putting a red cross on the doors, with the words, "Lord have mercy on us." Up to that time as Renouard remarks, "pestilential epidemics had been generally regarded as a scourge from heaven, whose progress no human barrier could arrest, and no more efforts

were made to preserve the people from its ravages than are made among Mussulmen."

To show that the same idea is yet extant, modified it is true by religious faith, it is only needful to refer to the petition of the clergy of England to the late Lord Palmerston to appoint, in view of a threatened visitation of Asiatic cholera, a day of fasting and prayer. This answer well embodies the existing state of sentiment upon this point in our ranks. "The best course," said the Prime Minister, "which the people of this country can pursue to deserve that the further progress of the cholera should be stayed, will be to employ the interval that will elapse between the present time and the beginning of next spring in planning and executing measures by which those portions of their towns and cities which are inhabited by the poorest classes, and which, from the nature of things must most need purification and improvement, may be freed from those causes and sources of contagion, which if allowed to remain will probably breed pestilence and be fruitful in death, in spite of all the prayers and fastings of a united, but inactive people."

Every day observation serves to show that we can discover no relevancy in health and disease to righteousness and wickedness. A man is often seen pure in spirit and in deed, and yet a life-time victim to terrible disease: another, vicious and wicked, and yet a perfect marvel of health and strength. Yet it is quite obvious that while the bulk of mankind believe diseases to be sent by a power whose ways are past finding out, will it subvert the idea of personal responsibility for their productions; and hence, of faith in the means of avoiding them. Every proposition looking to the abrogation of disease will thus be regarded as an impossible or impracticable scheme, and many of the claims of sanitary science will be treated with ~~an~~ indifference, or with disdain.

The age of faith in etiology may be said to have originated with Hippocrates. To him is due the honor of separating for

ever the healing art from the ecclesiastical function ; and of showing that the source of disease is not supernatural but natural. He believed and taught that diseases arise from the rotations of the seasons, from regimen and temperament producing a ripening of the humors ; and that the cause of epidemics was to be found in special constitutions of the atmosphere. Sydenham and Stohl believed in this secret epidemic constitution, and very many medical men of to-day yet have faith in its existence. Of course so long as this notion prevails will there be skepticism justly, as to man's power to prevent, or exterminate pestilences.

In no small degree does this view of nature's responsibility for disease, or that there is such a thing as an epidemic atmospheric condition also serve to keep sanitary science in the background.

If there really is, what so many virtually claim, an unfitness in our natural surroundings to sustain life in a healthful manner, the hope of our ever being made free from so much disease must indeed be dim. We can not hope in coming time to be able to remove the asperities of climate, the fluctuations of heat and moisture, the perturbations of electricity, the processes of growth and decay, and the rotations of the seasons. If these are the prime agencies which serve to make the earth an unfit habitation to sustain life in man in a healthy manner, then indeed is he doomed to wallow in the old substratum of evil. But, on the other hand, if the lack of adaptation to our natural surroundings arises from a weakening of the body by the infringement of organic laws, whereby the external forces gain an ascendancy over us which they do not normally possess, then may the hope that our race may be relieved from the grasp of disease, be warmly cherished. We have only to live accordantly with the laws of our being, or, in other words, give the force of life in us a good chance, when it will rise superior to disturbing causes from without. I might, had I time, enlarge on this

point, and show, by what seems the most incontrovertible evidence, that this constitutes the era of reason in etiology and furnishes the true explanation of the apparent unfitness of human life to the conditions amid which it is placed; man so impairing and depressing vital action that it is at the mercy of conditions perfectly normal. But I have already been too long at the threshold of my subject.

Sanitary science, or the regulations designed to secure health, are conveniently divisible into ten rules or laws. These laws, it is thought, embrace all the uses man is justified in making of himself, as well as the scope of his relations to nature in a sanitary point of view. The exposition of each law must be necessarily brief, and far from containing all its etiological applications; a labor not required when addressing those habituated to reflection on the subject of disease. Still, it is sometimes needful to jostle imperfect and unsatisfactory modes of thinking somewhat roughly, especially when they have become smoothly and deeply grooved by the wear of centuries, else there can be no progress. It is a peculiarity of great age to be distrustful of recent improvements, calling them new fangled devices which seem to bode more of evil than of good, or more of error than of truth. It is needful that while we are commonly deemed, and perhaps justly, the most conservative representative of the healing art, that our conservatism should not degenerate into bigotry, nor into an undue reverence for the past, but hold fast only to that which is indubitably true, and hold lightly to that which is uncertain, or merely traditional, ever ready to welcome truth and light whether coming from the obscure or the eminent in our profession.

The first law to which I ask your attention is, *breathing a pure air*. Twenty-five thousand nine hundred and twenty times every twenty-four hours does the human chest expand and contract so as to draw air into the lungs and throw it out again. What goes, or was designated to go into the lungs

is vitalizing, what goes out is life destroying. The mere fact of air being *expelled once* from the lungs is *prima facie* evidence of its unfitness again to inspire. Expired air is not only richer than ordinary air in carbonic acid, but it contains the animal rinsings from six hundred millions of air cells, exceedingly destructive to warm blooded life.

Pure air is the natural food of the lungs, for they consume a part of it just as much as the stomach does bread—and they need fresh food, not three times a day, but more than twenty-five thousand times a day. So essential is this food for the lungs, and the motions of the thorax in getting it, to life, that the suspension of one or the other for five minutes is equivalent to death. An instant's contact of the inspired air with the cells so weakens and pollutes it that it is driven out as unfit any longer to sustain life, and this, more than a thousand times an hour. To show that expired air is poisonous, it is only needful to put a mouse in a small air-tight bottle, when soon the terrible mode of dying which destroyed 146 men in a single night in the Black Calcutta hole, will be seen. Under natural circumstances inspired air is therefore the breath of life, expired air the breath of death.

According to Prof. Parks a man needs every hour 2,000 cubic feet of *new* air. How does, or how was it designed that he should get this? Let us see. Have you ever thought of the wonderful mobility of the atmosphere. Its great and leading law is motion. It either moves with the swiftness of a hurricane, or so gently that you can only detect it by the movements of hazy dust, illuminated in shadow by a sun-beam. It sweeps away the foulness generated on our streets and court-yards a thousand times a day; it carries off, and diffuses your breath or death into illimitable space: to be reconverted by the action of the sun upon the cells of vegetables into the breath of life. A very important and beneficent purpose is thus subserved by this law of never

ending motion ; preserving man and beast from being enveloped in a halo of foul excretions always emanating from lungs and skin. Yet man has done, and is to-day doing his utmost to set this law at defiance. He builds himself houses, tight of joint, thick of wall, and as impervious to outside air as it is possible to make them. His object is to box up tight a few hundred cubic feet of air and live in it, the night and sometimes the day through. A leaky window frame or door crevice is an imperfection and must be remedied. Anything like a current of purity from without, anything like air motion in a house is a woman's abomination.

In this motionless air, men, women and children, immure themselves, often from morn till eve, and deem themselves and those they hold dear, fortunate in having the privilege of breathing and rebreathing this breath of death the entire night. Take the stupefaction of the olfactory nerve away by a walk in the pure crisp air of the morning, and then re-enter the room where you have slept and waked, and its foulness will almost stagger endurance.

Indeed it is a prime object everywhere and among all classes of people, in houses private and public, in school rooms, halls, churches, railroad coaches, to *imprison* a little air—heat it—and live in it. Little wonder that under such a system man should be sickly—little wonder that with the lungs half starved three-fourths of the time, they should go into a decline, and perish by consumption. As physicians we are very careful that the stomach shall have an abundance of good pure food, but wholly overlook the needs of half starved lungs. We too often forget that every molecule of matter in the blood must have its molecule of oxygen, else it becomes not only useless but pernicious.

Children suffer more than adults by long starvation. In proportion to their size they exhale more of the deleterious compounds, absorb more oxygen, and breathe from three to five thousand times oftener than adults in a twenty-four hour

period. Hence they suffer more quickly and acutely from lung starvation, and perish in immense numbers by convulsions, tubercular-meningitis, scarlet • fever and cholera infantum.

The late Dr. Meredith Reese devoted much time to investigating the causes of infant mortality in cities; and the conclusion at which he arrived was that the rate furnished a true measure of air impurity in any given locality.

For the preservation of health the requirements of this law are imperative, just as imperative as that the air now momentarily in contact with the air cells of your lungs should be ejected, because deprived of some of its life giving properties, and charged with some that are death giving. To live and breathe in an air which is pure, its natural movements must not be arrested. To this end there must be ventilation; or a current of air in some definite direction. The mere agitation of that boxed up within impervious walls is not ventilation any more than the upward and downward motion of water in a stagnant pool by unequal heating, is not a current. Ventilation means running air, just as a brook means running water.

The foolish fear of air currents, with the body properly protected, is the worst possible for health. With the blood pure and strong, no one can take colds: with it impure and weak, no degree of care can prevent them; not even a hot house uniformity of temperature. And how can any one have pure blood by breathing impure air, how can the blood be warm and lively without oxygen, or clean and sweet unless the 600 million of cells in the lungs are washed out every instant with pure air? The lower animals when left to themselves always get pure—they do not rebreathe breathed air, and they scarcely, if ever, have colds or consumption. But subject them to human restraints, keep them in close houses, and stagnant air, and their colds and diseases become wonderfully like our own.

Some author has quaintly remarked that when men live in reed houses, they are as of oak, when they live in oak houses they are as of reed. •

The idea of strength being gotten only through eating and drinking has become an overshadowing one. While the stomach of invalids is whipped up with stimulants and tonics, and loaded with the richest elements the earth affords, the needs of half starved lungs are wholly neglected. Such persons are usually kept closely in some boxed up stagnant air, not only necessarily impure but thin and weak by expansion. Putting the hand by the ~~outside~~ opening of the key-hole in any ordinary constructed room makes one sensible that air is rushing in from without as if it had been exhausted by an air pump from within, near to the point of a vacuum. It is also seen that the air in the rooms of invalids is being eaten up and contaminated by gas lights, and that deadly carbonic oxide gas is exuding from the surface of a red-hot furnace. The vitalizing influence of sunlight is also carefully excluded, and yet surprise is expressed that so much wine, iron and food does not ripen into strong, red blood, and firm toned muscle.

One thing more in regard to the air of houses in midwinter. As a rule it is kept far too warm; the difference between the temperature in a house and out of it, is far too great. Said an invalid to me not long since—I must leave this country—the climate is too changeable—I can not stand it. You may think so, was my reply, but you yourself create change of climate which in suddenness and severity exceed all of nature's a hundred fold. How is that? On the inside of your house is the climate of the African desert, dry, hot and stifling, on the outside, that of Greenland, damp, cold and biting; and you pass from one to the other a dozen or more times every day in an instant of time. With proper ventilation in houses there would not be the climate of Cuba one moment and that of Canada the next, the proper course

for comfort and health being *to clothe the body more, and warm houses less.*

In these ways art not only serves to render air impure in houses, but it does much to affect the same out of them. Especially is this true of towns and cities. Upon a small area immense quantities of organic matter are collected, which in greater part must sooner or later pass into a state of offensive decomposition. With eyes and ears closed, and nostrils open, the homes of some families may be told by their odor; and no less is the same sense able to distinguish the air of a city from that of the country. The sense of smell by the way is not simply as some seem to think an organ for pleasure, or the reverse, but it is the outpost sentinel of danger to the lungs and blood. In delicacy and availability for sanitary purposes it is far superior to all chemical reagents.

There has been much written about the malaria of the country, though for one, I have never been able to find much evidence of the mal, or bad air about it, but a great deal of the mal about the air of towns and cities. We all mind it most "when the wind don't blow;" for then nature's great foul air scavenger is at rest. Decaying organic matter lines the streets, lies in heaps in alleys and court-yards, fills open vaults in the form of ordure, and pollutes the water of every gutter. Mingled with the effluvia from all these sources, is the foul air from thousands of chimneys, the foreign gases engendered in manufacturing, and the whiffs of abominable air from filthy abodes. Were it not for the wind which sweeps our streets by its almost uninterrupted motion, and the law of the diffusion of gases into each other, the malaria of cities would blast and wither life like a simoon.

With houses built so as to be swept by the wind on every side, lofty chimneys, wide and scrupulously clean streets and court-yards, the most improved sewerage, the removal of manufacturing from the vicinage of human abodes; in other words, with the sources of impure air on the outside of houses

corrected, and with pure air secured by thorough ventilation in every occupied room day and night, not only would the causes of colds, coughs and many fevers be destroyed, but the chief cause of the most fatal disease of civilized life, pulmonary consumption, would also be destroyed—a disease I unhesitatingly affirm arising in ninety per cent of cases by depriving the lungs and blood of that upon which they feed, and of which nature is so provident—an abundance of good pure air.

The second sanitary law to which I invite your attention is

ADEQUATE AND WHOLESOME FOOD AND DRINK.

If it should be asked whether mankind think more of living to eat than eating to live, the answer must be in favor of the former. Were it the object to eat in order to live, we would have little to do in the way of dyspepsia, and not many would be seen to die prematurely because of grossly abused digestive organs.

In this favored land ninety-nine die of over feeding, where one does from under feeding. Many of you, like myself, have never seen a case of disease and death arising from under feeding, but have seen hundreds from over feeding and worn out digestive organs.

Numerous are the arts to induce over eating. The most tempting products of nature are collected from every quarter of the globe, subjected, when possible, to some process which will render them yet more tempting, and placed on our tables in this *order*: the plainest and least savory first, the richest and most savory last. As soon as the appetite begins to pall upon the first course, a second, a third, a fourth, and even a fifth are appointed to succeed it, each more and more tempting so as to provoke and renew desire. In this way the sense of satiation is deceived and outwitted, and far more food partaken than if such arts had not been resorted

to. The results are that far more nutriment is taken into the blood than there is use for; the energies of the stomach, overstrained, soon fail, begetting dyspepsia and derangements of the liver and bowels. All the organs engaged in so much taking in and giving out of aliments being put to it day and night, are overworked, and become liable to torturing derangements, death beginning its work in and through them. To any one who thus overworks his digestive and excretory organs, never was better and pithier advice given than that of Abernethy to a rich and dyspeptic nobleman, "to earn a shilling a day and live on it." There seems to me good ground for the opinion that an undue importance is attached to nurturing the body through the stomach. There is scarcely a medical writer who, when treating upon the diseases of the poor does not refer to deficient alimentation as a most prolific cause. Because they are deprived of many of the luxuries of the rich, a hasty sympathetic judgment is apt to conclude that that must be a cause of their illness. But what are the evidences of underfed bodies? Are not lean and stunted physiques the most patient? And are not their opposites, or large and stout bodies accepted as conclusive of sufficient nourishment when the horse or the ox is seen in such state? Look at the physiques of the poor, foreign as well as domestic, and as a rule, are they not larger and stronger than those of the rich? It is on account of other habits and surroundings that the health of the poor is often destroyed. The air they breathe is commonly very impure—their clothing insufficient, their habits irregular, vile and dissolute.

Relative inadequacy of food is more commonly a cause of disease, as, in a too great sameness in viands from meal to meal and day to day. The lack of fresh vegetables all know generates scurvy, and with children the lack of earthy phosphates, disease of the bones.

Considering the uses made of aliments by the animal

economy they may be divided into the carbonaceous and nitrogenous, or the heat and tissue making foods. The inhabitants of the arctic regions require a large preponderance of the carbonaceous, and those of the tropical regions a large preponderance of the nitrogenous. Capt. Hall resided for several years among the Esquimaux, and during the entire time had excellent health, which he attributed to eating raw blubber after the style of the natives, and sipping oil in lieu of tea or coffee. On the other hand in tropical regions rice, fresh vegetables, lean beef and acid fruits are what the natives subsist upon ; and are besides, what experience has shown best conduces to the health of those who migrate to the torrid from the temperate zones.

Now, we of the temperate zone have some polar and some tropical experiences each year ; which, upon the theory of the uses to which foods are put in the body must require unequal portions of the carbonaceous and nitrogenous. Is this fact recognized and acted upon in its sanitary bearings ? Do we eat in winter more of the carbonaceous and less of the nitrogenous than in summer ? I opine the custom and habit rule the conduct in this matter far more than craving or science. So long as this is the case will there be so much of what is called biliousness, and the necessity each spring for earthartics to thin the dark and rich blood of winter, and thus prepare it for the season of fervid heat.

In reference to the wholesomeness of foods I shall no doubt be considered at variance with prevailing views. During the vernal season immature vegetables so far from being injurious are really necessary and wholesome. Observe how nature prepares the animal kind for the heats of summer. Then their nourishment is weak, laxative and watery, just as, on the other hand, in autumn, it is rich, strong and fattening. But man thinks he knows better, and must eat as much bacon, lard, butter, etc., in spring and summer as

in winter, despite all the unheeded cravings—the mute appeals of nature, for something immature, green or sour.

Then again, wholesomeness and palatability are too often confounded. If some article of food is well cooked it is wholesome, if ill cooked, unwholesome. Now, the true purpose of cooking is to commence the process of digestion, coagulating the albumen, transforming starch into dextrine and rendering food granules more tender and susceptible to a speedy action of the gastric juice. Undue refinements, by grinding, sifting, boiling, clarifying and condensing—though they may render food more palatable, increase the labor of digestion—the process of reducing fruits by prolonged boiling with sugar, to preserves, or into marmalades or butters, renders them very savory, and serves to make them keep well *out* of the stomach, as well as to keep well in it. A certain degree of naturalness in food is essential to proper alimentation and to easy and quick digestion. Take in illustration our artful mode of managing the wheat kernel. The grinding is well enough, it saves labor for the jaws and teeth, but to separate the ingredients into a fine and palatable part, and into a coarser and more unpalatable part,—the latter to be rejected and thrown before swine, is at least to say, that the most perfect form of food for man is after all very imperfect. But experience has shown nature's wisdom and man's ignorance, for by rejecting the outer shell with its layer of phosphates three important objects which contribute to the welfare of the body are lost. 1st. For easy and quick digestion a certain degree of coarseness in foods is essential. Flour, of an impalpable fineness can not readily be penetrated by the gastric juice. The pharmacist is aware that in extracting the medical virtues of substances by alcohol—one of the most penetrating of liquids—fine powdering impedes, instead of facilitates the process. So it is with foods made any finer than what the molars are capable of effecting. 2d. By casting aside the branny covering with its shell of phosphates, the

growing bones of the young, and the brain, hair and skin are often deprived of adequate nourishment, producing disease or deformity in some form. When reason or custom thus misleads, an underlying instinct sometimes directs, as in the invincible desire now and then seen among the young to eat lime or clay. 3d. By separating all the coarse bran from the fine flour,—the residuum after digestion is so small and compact that the bowel does not receive its needful stimulus, and so becomes torpid in its excretions, and sluggish in its movements. Costiveness, headaches, and piles are the common results. The habitual use of Graham biscuit, brown bread, or cracked wheat, has according to my observation done more for habitual constipation than all the vaunted remedies of the *materia medica*.

In no one thing is the difference between civilization and barbarism more marked than in the management of foods. The barbarian takes his meat and drink very much as it is prepared for him by nature; the man of culture as modified in a thousand ways by art. And this art is commonly directed to a single object: the ministration to the sense of deliciousness. The object at our tables is not so much to eat what will meet the needs of the body, but what will give the greatest amount of piquant enjoyment, thus caring more for the means than the end. Not a little of our civilization is thus pure sensualism, or practical epicurianism, theoretically detested and denied. The consequences are that we are almost a nation of dyspeptics; while our savage neighbors either too ignorant or indolent to seek after our keen palatine pleasures, or content with nature's delicacies, hardly know what indigestion is. In body and limb they are splendid examples of physical development, they need not, as we do annually, millions of gallons of bitters for the stomach, and an army of dentists to keep their teeth in order.

No one with a bad digestion can long preserve good teeth. A furred tongue, and bad taste each morning, are sure

indications of depraved secretion and nutrition in the mouth ; and is it to be expected that teeth nurtured amid disease, and bathed with unhealthy secretions can long retain their beauty and life ?

The sanitary rule of drinks is a simple one—pure water. How to obtain this are more questions of will and engineering skill than of hygienic import. A popular fallacy, one that even prevails to some extent in medical ranks, is that because the drinking of impure water seldom produces *immediate* disease that it is not therefore very harmful. A like notion prevails by the way, in reference to breathing impure air, eating unwholesome food, the use of tobacco and moderate indulgence in ardent spirits. Some do one or the others for years, and yet have no serious illness. But the same may be said of opium and arsenic eating, or in fact of any deleterious habit. The gourmand, the masturbator, the tight lacer, the sedentary, the one with brain or body overworked, and the most uncleanly person may live so for years without active disease ; though this by no means proves that no harm is resulting, or will result.

When disease shall appear depends upon the intensity of the cause and the resisting power of the constitution. An intense application of any of these causes no one can long resist, but the strong longer than the weak. In this everything depends upon inheritance ; if a strong constitution like a rich patrimony is inherited, reckless dissipation will bring about, only more slowly the bankrupt condition. The poor in constitution, like the poor in purse, become bankrupt in a year or two ; the rich in constitution or purse can run much longer. But reach a time all such certainly will, when there will be no more to spend, and for the rest of their days they will lament their folly, and eat in barren repentance the bitter fruits they have sown. The young and vigorous in answer to remonstrances about imprudent eating or drinking gaily say such things do

not hurt them. Wait and see. In a few years when they ought to be in their prime, what do we behold but poor, pallid, lank, complaining, miserable wrecks, and yet dissipation did them no harm! They realize the force of the old adage "that every man is either a fool or a physician at forty;" and become wise only when it is too late to save.

It may be laid down as a law, that infringements not punished at one end of life are sure to be at the other. The organs most abused are the ones through which disease and death enter the body; and the history of a man's life may be usually read through his mode of dying.

As medical men the bearings of stimulating drinks upon health need more definite settlement. The moderate use of such beverages, it is alleged by not a few authorities is not inimical to health. And the diligence with which some apologize for their use, or seek after some important object they are capable of accomplishing in the animal economy, leads one to suspect that they are not unbiased in their judgment by the gustatory sense.

It is claimed for spirituous drinks that they serve to arrest retrograde metamorphosis, but in health *cui bono!* Is not cell metamorphosis the ultimate process we are able to perceive, upon which life itself depends. Arrest cell change, and death results, make it a little slower or faster than the physiological standard and disease ensues. What then is the advantage save under exceptional circumstances of interfering with it with alcohol. If it is an efficient and economical retarder of waste in the body, surely the farmer ought to avail himself of it in fattening his stock. But it has been experimentally determined that after the influence of alcohol upon cell change passes off metamorphosis is just as much accelerated as it was previously retarded. Where then is the gain, and what good can arise by interfering in this way with physiological change?

The opinion once entertained that alcohol furnishes fuel

for the heat making process in the body, has been shown to be erroneous. It is expelled from the body as alcohol, its elements unused and unuseable. The glow of heat which succeeds imbibition is not, as the thermometer has demonstrated, due to an increase of temperature, but is probably produced by the benumbing, tingling quality of the alcoholic poison upon the nerves. As Dr. Parks remarks the testimony of arctic explorers is singularly unanimous that alcohol notably diminishes the power of the body to endure intense cold.

The testimony of British army surgeons—among whom I may mention Inspector General Sir John Hall—and of American surgeons, to be found in the Sanitary Memoirs of the rebellion, are against the use of spirits by the soldiers as a health promoting measure. Indeed it is difficult to understand upon what principle or law the health of the healthy can be preserved by imbibing a poison. Its use when there is disorder, or the elements of death at work in the system is another matter.

That alcohol is a poison there can be no well grounded doubt. The degeneration of tissue to which it gives rise, the hob nail liver, and the tremor with delirium are sufficient evidences. There would be no difficulty in gaining assent to this, were the primary effects of alcoholic drinks not so agreeable. Even the secondary effects, the nausea, vomiting and headache so commonly following inebriation, would be deemed sufficient evidence of poisoning had they arisen from drinking some particular kind of water, or some not very agreeable substance.

An erroneous notion, widely disseminated, is that the greater prevalence of delirium tremens now, than during a period yet within the memory of the living, arises from the great extent to which it is alleged the adulteration of liquors is carried. The fact is apparently forgotten that no poison save alcohol is capable of giving rise to this particular form of disease; as well as, that in the rural districts the disease is

perhaps as rare as it ever was. I ask you, who have practised among intemperate farmers, if the disease is not exceedingly uncommon. The ability of the country man to resist alcoholic poisoning better than the townsman comes from his otherwise better habits—the pure air he breathes, the out-door exercise, and his superior stamina of constitution.

All the poisons to which mankind have become addicted have one effect strikingly characteristic. The use of water for twenty years does not increase the craving for it, nor does the taste grow by use for a peach, an orange or a lemon. But those addicted to tobacco, to spirituous drinks, to arsenic, to opium, to hasheesh, find that the desire for them increases in intensity; leading to greater and greater excesses until the will and judgment are wholly subjugated. The same is true though to a minor degree, of tea and coffee; their worst tendencies however being in producing that state of the nervous system which renders the enticements of stronger stimulants, a part of our nature. What stronger evidence could we ask, that the use of such substances is unnatural and deleterious, leading those who yield to temptation on to their own destruction.

The third sanitary law is,

ADEQUATE OUT-DOOR EXERCISE.

The stock breeder in raising young kine and horses is very careful they shall have the freedom of the field, and perform very little forced labor of any kind, until their growth is complete. He is very well aware that much confinement renders them tender and liable to disease, that much labor stunts their growth, spirit, symmetry and perfection of development. It is a proper subject for lament that the application of a little of the like common sense is not made by humans in raising their young.

A child, as soon as it begins to walk, has an instinctive and almost uncontrollable desire for free out door activity. It is upon this that our vaunted system of "training a child

in the way it should go," is first expended. There is thought to be something bad in the restless, fidgety, noisy, whooping boy and girl. They must be taught to be quiet, to stay in the house, and behave like some quiet demure old woman. The model child is a quiet child, an old-acting young child. To this standard fathers and mothers strive to bring their children. The noisy, rollicking boy is the horror of nervous women, and the romping, loud laughing girl is considered exceedingly rude and ill behaved. The repression of childish playfulness, which a mother can not accomplish at home, is attained in the school room, and this is often a motive for sending noisy boys and girls under the dominion of the teacher. The usual physical effects are soon displayed. The diminishing appetite, the paling cheek, the thinning flesh, the frequent headache, and the marked falling away of spirit or liveliness is regarded as evidence of taming down, but which tell a tale of cruel and injurious restraint, and which in the young of domestic animals would create solicitude as to their thrift, health and growth.

The strong yearning of the young for an active out door life has a most beneficent purpose—the making of vigorous, symmetrical and healthful bodies. The venerable Erasmus Wilson wrote, "Youth, it can not be too often repeated, is the time for storing strength, both physical and moral, and every act which can in any way impede or frustrate this all-wise-intention of nature will tend to lay the foundation of a weak and imperfect body, and shorten the days of its possessor."

The significance of the falling away of health, strength and vigor are quite different in youth from what they are in adult life. In such cases in youth, there is not only an arrest of the strong process, but a using up of a slender stock on hand, there is a going backward at the only time that a going forward is possible; while in adult life there is no

arrest of development, there is no arrest of accumulation, but a simple using up of that on hand.

The disregard of this requirement for the best physical development, works out an amount of suffering for the human family beyond computation. Trained up so as to make bodies frail and tender, and nerves large and susceptible, every rude breeze chills, every touch bruises; and, with women especially, life is made up of moments of exciting pleasure, and hours of depressing misery. Women can be found by the thousand who have not had perfect health during an entire week for a score of years. In large part is this produced by their hot-house indolent habits, by faulty training during their expanding years. The forced and prolonged quietude of the school room, and the repression of playfulness by vain and shortsighted mothers, lie at the foundation of the evil. The protracted deadening inaction of our school system; its exclusive straining attention to brain, and total disregard of bone, muscle, blood and lung, **urgently need reform.**

The benefit from mental training does not depend upon the time devoted to it, nor upon the perfection of muscular inaction, but upon the intensity of the attention. And how can this be obtained with back and limbs aching by long continued constraint. Not one of you could think connectedly or deeply under such circumstances, and how much less should it be expected of restless boys and girls, whose inherent desire for motion and intolerance of confinement is so much greater? The stupid fashionable vanity of compelling children to sit like statues, in long continued unbending uprightness causes the vertebrae to ache, to inflame and finally to ulcerate from the steady weight and severity of the pressure on each other. Examine the poor beast that drags the canal boat, and its shoulders will be found either to be raw, or scarred with what has been rawness. The cause of this more than with other kinds of draft, arises from the steadiness

of the pressure upon the shoulders. So is it with the steadiness of the pressure upon the bones of the spinal column in children of the school-room—whose bones are as yet imperfectly developed; resulting in crooked spines and deformity for life. But, it is not alone in undue action of the body in the school-room that disorders arise, over action of the brain is also prolific in diseases. The latest developing organ, the brain is forced forward, the earliest developing part, muscular activity, is forced backward. The nutrition which should be expended in material brain growth, is spent under a task master in forced mental work, producing childish precocity and adult inanity. A compromise must be effected between the requirements of the physical and mental systems if we wish to have anything like healthful, strong and long-lived men and women.

For the preservation of the health and strength in adult life, out-door exercise is only second in importance to what it is during the period of growth. The organization of our social system unfortunately tends to prevent this. One class of men may be said to do all the thinking, another all the acting; one gets overmuch muscular labor, the other too little. The one is pale in blood, thin in flesh, turgid in brain, quick in nerve; the other is ruddy, muscular, cumbrous in bone and point, slow and dull in brain. The farmer inured to severe out-door labor from childhood up, seems a marvel of ponderous strength, yet the showing is mainly on the exterior, and is often as striking as it is deceptive. The interior organs—the evolvers of the force, having been put to it all their days to make up for waste on the outside, do not possess an abundance of reserve energy. After a hard day's toil these interior parts often throb with excitement by their efforts to supply the waste from without. The digestion of a full supper is frequently from this cause impossible, and every attempt at deep and connected thought is futile. It is otherwise with young men raised in towns and cities. With

them there has not been a monopoly of energy for the exterior ; these organs of generative force have had time and opportunity to gain in growth and power. Thus it is, that the son of toil does not have interior organs of production adequate to his exterior organs of expenditure—while with those of towns, who have not toiled wearily all their days from morn till eve, the ratio is just the other way. From this cause during the late rebellion, to the surprise of many, the soldiers from towns and cities displayed—if I may be permitted the use of the turf phrase—more *bottom* than those from the rural districts.

The lack of sufficient out-door exercise among American women is perhaps the most influential condition which has rendered them unusually tender and frail, and their beauty so short-lived as to have made it proverbial. Secluded in warm, close, darkened rooms, nine-tenths of their days, and nourished on rich and concentrated viands, they bloom in early spring, and wither and die in what ought to be the summer of their lives. The plant always in a calm, and in a hot-house uniformity of temperature, and the plant always in a storm, are not normal productions. The one is rough, angular, scarred and scraggy, the other is over soft and fragile. How easy the latter is to bruise, how tender to every rude touch, how susceptible to chilling winds, how soon it blooms, withers and dies. Just so is it with American women. The maid of one year is with difficulty recognized in the mother of the next, and for a single year of pleasure or of a forced untimely beauty, they have a dozen of withered repulsiveness. This premature breaking down and chronic ill health has been popularly attributed to the climate, true to the acquired bend of the mind to lay the blame for our ailments on anything or everything save ourselves. To vivify the blood and cause it to tingle in the nerves with exuberant life ; to knit the flowing globules into firm muscle, bestowing not only a lasting and charming

contour, but vigor and elastic grace to every movement, daily exercise and exposure to the shining sunlight and pure air are indispensable.

English ladies of rank understand this, and think nothing of walking their four or five miles a day, while our ladies in town and country would think such a thing "perfectly dreadful!"

The fourth law is,

ADEQUATE AND UNCONSTRAINING COVERING FOR THE BODY.

The relation of clothing to health is confined to four points: 1st. Its sufficiency. 2d. Uniformity. 3d. Ease and Lightness, and 4th. Unconstraint.

A useful lesson may be learnt from nature as to the proper mode of covering for the body. Take that of the horse as a familiar illustration. It is light, easy and uniform over all parts. In spring and summer it is light and thin, and in winter thick and shaggy. When the weather is warm the hairy covering lies flat and limp, when cold it is erect and furry; the precise states affording the least and the greatest protection from cold. The body is not thickly covered one hour and uncovered the next, it is not cramped by tight covering at one point, while at another it stands away from the body from two to twenty inches; nor are the neck and shoulders ever bared while the waist and loins have a triple thickness.

In reference to the sufficiency of clothing no absolute rule is enjoined. Individual sensation is undoubtedly the best guide—though this, as all know, is very much under the control of habit. With plenty of wholesome food and pure air the slighter sensations of cold are not productive of disease. Like the feeling of hunger it is natural and harmless, but to feel cold all the time, like feeling hungry all the time, clearly denotes inadequateness. The habit of clothing in-

fants and children thinly with the view of hardening them is a pernicious one. At this period of life the system is tender and capable of but small resistance; while a constant drain of heat from within stunts the growth and hinders the development of that strong vitality, which in manhood rises superior to all external changes.

Notwithstanding the importance of uniform covering for the body, it is systematically disregarded. Pride and a slavish subservience to fashion require that parts of the body warmly clad at home, are to be thinly clad, or even bared on the street, or at a social gathering, without any reference to external temperature. Even the superior hardiness of the beasts of the field could not long withstand such artful habits and exposure. Parts habitually open to cold like the face and hands acquire, through increased vascularity, superior resisting power, just as parts subjected to unusual friction or great pressure, acquire, through a horny hardness, superior resisting power—and to apply cold like friction or pressure, to tender and bare parts, will be followed by disordered results.

Lightness and ease of clothing for the body are not minor matters. All of nature's models in which a high degree of protection is requisite, are of this character. The fur of the beaver, the down of the Orkney duck, combine in a remarkable degree lightness, ease and warmth. Man has not even creditably imitated, much less excelled, nature in this matter; but in making his fabrics for warmth strives to make them as firm, close, smooth, or highly dressed as possible; than which a more effectual mode to diminish their protective quality could not be adopted. Observe the domestic fowl taking to its perch during the most intense cold of winter, and instead of drawing human like its protective covering close to the body, it shakes its feathers out loose or erect from the body. Long, fine, loose, and thick fibres are the true models for warmth, and in manufacturing garments for

protection, instead of carefully removing the nap, the great care should be to preserve and increase it. Three pounds of wool thus wrought into a garment, would be far more protective than ten made into hard, firm, smoothly dressed cloth. The weakly would not then be borne down by the weight of dense, heat-conducting clothes, and they would not be in a shiver three-fourths of the time; for it ought to be remembered that the ability to carry a great mass of clothing is usually in an inverse ratio to the necessity for it. Clothing which constrains the natural movements, or impedes the flow of blood, is a frequent source of disease. Tight, badly fitting boots or shoes, by impeding the flow of blood, and bringing severe pressure on a few points of the foot, developes, as is well known, those painful and deforming excrescences, corns and bunions. Tight, unyielding hat bands in the same way hinder the flow of blood in the pericranium, and so on all the parts above the band—with the assistance of confined and overheated air, destroys its beauty and life.

But the worst form of constraint to natural movements comes of tight lacing. There, the parts involved are essential to vitality, and in addition to suffering, there is a serious interference with the fundamentals of organic life. Tight stays, by hindering the motions of the lower ribs, and obstructing the circulation in the walls of the thorax, cause atrophy and weakness in some of the respiratory and spinal muscles, and often to such a degree that women when without this artificial support, feel their weakness so greatly that they are perfectly miserable. Still more important is the interference with the motions of the stomach, the expansion of the thorax and the impaired circulation and nutrition of the liver and adjacent organs. The action of the heart is sometimes temporarily overcome, as in fainting, the lower edges of the lungs gorge, the stomach emits creaking sounds, the nose purples, the bowels are pressed downwards, the womb falls,

and sanguifying is imperfectly performed. Following these immediate effects are others more remote. While abounding in youthful energy and elastic vigor—internal organs are not apt to become fatally deranged by this vicious custom. Still their nutrition and strength are impaired; and as soon as there is a drain of strength from any other cause, as by maternity, or by advancing years, disease of the impaired organ is almost certain to become manifest. From this cause very many women decline and die after the first child-birth. The organs whose function it is to elaborate blood being scarcely equal to the requirements of one life, succumb when required to elaborate plastic matter for two. Hence, women who have long been tight lacers are either exceedingly thin, weak and wan, unable to walk a farlong at a time, or some intractable disease seizes the maltreated organs, hurrying many mothers into untimely graves. Did the evil cease with themselves, ~~ignoring~~ ^{regarding} of such conduct would not be so dark and damning. Bringing children into the world, feeble in frame and weak in constitution, is a terrible evil. That such is a result of tight lacing it is only needful to recall the fact that the organs which suffer by the constraint are those engaged in the elaboration of blood. Enfeeble or impair this process, and how can the mother elaborate an abundance of excellent blood wherewith to nurture into a strong life the embryotic germ. It stands us in hand even as physicians to remember Sir Wm. Hamilton's sage remark that "constitutions are not made, they grow;" they grow by and through the quality of the life in the parent cells, and the quantity of blood furnished by the mother.

The sanitary law next in order is,

THE EXERCISE OF THE SEXUAL FUNCTION ONLY FOR,
AND NO INTERFERENCE WITH THE NORMAL FUNCTION
OF REPRODUCTION.

Between man and the beast of the field there is this striking difference, the latter attains its highest good through the

direct insight of instinct—a quality which seldom errs, and is non-progressive, while man can only attain his through reason—a quality very liable to err, and eminently progressive. An animal's nature is a law unto self, it cannot do otherwise than conform to it, while man's nature is not a law unto itself, and he *can act* in consonance or dissonance to ascertained law. Hence, as Bushnell maintains, man is truly a supernatural being, obeying or disobeying natural law as to him seemeth best. But while he has this freedom, he is also aware that in this very freedom is contained the measure of his responsibility. The reasoning faculty informs him that if he does certain things, evil results, and if he does certain other things, good results; so that in a moral point of view, though he has the power he has not the right.

These differences, the manner and results of certain courses of conduct, are well illustrated by the reproductive act. Were it not for the pleasure attending co-habitation, the earth would soon become an uninhabited globe. The reproduction of species is forever insured by the powerful attraction of sensual impulse. Animals cannot disobey it, neither can they deviate from the periodical times for its exercise; they never co-habit when reproduction is impossible, neither can they evade the end in the use of the means; in short, with them pleasure and reproduction or the means and the end are inseparable. With man it is different; he can, and he does separate the means from the end; he can and he does co-habit when reproduction is impossible, he does evade the end, and he practices sexuality when he pleases, pleasure not reproduction being the great end in view. Perhaps some may think this one of the prerogatives of rational beings, a privilege vouchsafed to the possessors of a God-like nature. I shrink from considering such a desecrating view of the objects of our superior nature, much less to think the High Ruler ever designed our greater light to show us the

way to depths of carnality of which the lower animals are happily incapable. What would *we* think of any species of the inferior animals which seemed to live only to practice sexual intercourse to the full limit of their ability without the possibility of reproduction; and practiced it through the entire period of pregnancy, bringing forth their young loathsomely diseased? Would we not execrate and exterminate such foul creatures from the face of the earth? And, if this would be the effect of such a disgusting exhibition of sensuality in the lower animals, what ought it to be considered in him who was made in the image of his Creator? Let its practitioners and defenders answer.

The accumulated experience of centuries conclusively shows that whenever man converts what was designed as a means into an end, harm or evil ensues. We have already seen that this is the result of our studied efforts to turn palative pleasures into ends, instead of the simple means of existence. The same is true of the misuse of the procreative organs. Solitary indulgence, of course, precludes anything like reproduction, and its evil results are too well known to need enumeration. Then excessive and promiscuous intercourse without the possibility of reproduction is extremely fruitful in disease. Mankind are the only beings that have the unhappy distinction of being scourged by a host of sexual disorders. Even attempts of curious students to propagate the syphilitic virus among the inferior animals have failed. The only violator is with propriety the only sufferer. Dysmenorrhea, amenorrhea, menorrhagia, leucorrhea, and malpositions of the generative organs are in the female of very common occurrence. Bumstead is of opinion that by excessive venery and other debilitating causes gonorrhea may originate independent of contagion and among women strictly virtuous. When the behavior of the animal male and female to each other during impregnation is compared with that of humans, it is enough to make us blush

for our kind. What we in derision misname an animal propensity we practice to an extent unknown to them. The male animal seldom insults the female during pregnancy, and when he does, the latter defends herself with ferocious zeal. It is for man to outdo the animal in animal indulgences, to out-Herod Herod, and prostitute the body to the single service of sensuality. All classes and conditions in society practice this thing, even those who are so unmerciful and free in their denunciation of promiscuous prostitution. Coition for any other purpose than reproduction, or with the design of evading it, or at such times when it is impossible, is prostitution, no matter whether committed within or without the ban of marriage. It is for the medical profession to teach in this thing a higher and purer conduct, a higher and purer morality.

There may be and often is doubt upon laws claiming to be divinely promulgated, whether they are so or not, but concerning the origin of the law of means to ends, and of the evil results which ensue when infringed, there can be no doubt. The stigma of disorder or disease is but the handwriting of an occult and just power for laws infringed, their judgments silent and self-executing.

Coition during impregnation is a frequent cause of abortion and leucorrhœa. Upon the offspring, especially in mothers of a nervous temperament, it is fraught with evil. It tends to give the child a stupid, animalized expression, and predisposes to convulsions and that terrible disease, worse than death, epilepsy. Excessive venery will produce epilepsy in the adult, and is it to be presumed that the tender and susceptible embryo can escape such a tendency, such a predisposition, when every quality it possesses grows from those of its parents?

For the only creatures capable of infringing this law there is the terrible distinction of affliction by syphilis. You will agree with me that this is the most horrible disease with

which we are acquainted, pervading every globule of infected blood, almost irradicable, and descending through, with mitigated infamy and corruption, to offspring. Innocent children carry with them through life the brand of the disease in a peculiar formation of the front teeth, and are besides possessed of a taint that dooms them to derangement from the slightest causes to more or less suffering, disease or deformity, with the chances of being cut off in early life.

Not content with the largest indulgence of the sexual passion solely for the pleasure afforded, or with the design of avoiding its consecrated end, man with wicked purpose lays violent hands upon the results of sexual union. We are all well aware, not only by frequent applications for, but by the fearful results which often arise from abortions, that the wilful destruction of fetal life is far greater than is commonly supposed. It exceeds all other forms of murder at least seventy per cent., and with the destruction of fetal life there is every now and then that of the mother. Ovid long ago sung of the latter :

" But righteous vengeance oft their crimes pursues,
And they are lost themselves who would their children lose ;
The poisonous drugs with mortal juices fill
Their veins, and undesign'd themselves they kill,
Themselves upon the bier are breathless borne,
With hair tied up which was in ringlets worn."

Thanks to the out-spoken condemnation of criminal abortions by the best of our profession, its commission can rarely be laid at our door. To Dr. Storer and the American Medical Association is due the credit of a popular awakening upon this subject. The title of his essay, "Why Not?" aptly expresses the usual response of married women to the remonstrances of the physician against its performance. And, truth to tell, these remonstrances are usually of no avail, for when a woman once gets her mind down to the idea of being rid of her unborn offspring it is usually found

that where there is a will there is a way. They even learn, as you all know, to perform the operation on themselves or on each other, else through some patent nostrum, advertised with the significant caution not to be used during pregnancy, or else they procure the services of some low-bred well-known charlatan who adopts the destruction of fetal life as his speciality. The untoward influence of abortions upon health are too well known to need elaboration. When life is not immediately destroyed, the shock is often such that it is never fully overcome. Doubtless every one of you knows of one or more subjects of this violence who have not, since its date, seen a well day. Especially are the organs of reproduction liable to suffer; either the uterus or its neck remains in an abnormal state, and, as Dr. Storer remarks, toward the decline of life those who have suffered from abortions are more liable than other women to that terrible disease, cancer of the womb.

The sanitary law next in order is

A HABITATION IN THE CLIMATE FOR WHICH THE CONSTITUTION OF THE BODY IS ADAPTED.

It is a popular notion that mankind are by nature cosmopolitans. Taken as a race, they unquestionably are so; take them in species, and they are as much bound to a region as are the beasts of the field. Were it not for the artificial protection which they are capable of employing, the parallel would be perfect. Take a man or an animal, native of some tropical region of the earth, to England or the northern States of America, and under like circumstances one will not survive much longer than the other. Dr. Copland states that the negro suddenly transported to England seldom lives two winters in it. On the other hand, Dr. Boudin testifies of the French in Algeria that they would soon become extinct but for emigration. The same is true of the English in Bengal and the Antilles. Says Dr. Aitken, "When an

Englishman is placed in the most beautiful part of Bengal or Jamaica, where malaria does not exist, although he may be subject to no attack of acute disease, but may live with a tolerable degree of health his three-score years and ten, he nevertheless ceases to be the same healthy individual he once was, and moreover, his descendants degenerate. He complains bitterly of the heat, his plump, plethoric frame becomes attenuated, his blood loses fibrine and red globules, both mind and body become sluggish, gray hairs and other marks show that age has come on prematurely, the man of forty looks fifty years old, the average duration of life is shortened (as shown in life insurance tables), and the race in time would be exterminated if cut off from fresh supplies of emigrants from the home country. The European in the Antilles struggles with existence, a prey to fever and dysentery. He is unequal to all labor, becomes wasted and wan, and finally perishes. . . . Our army historians tell us that our troops do not become acclimated in India. Length of residence in a distant land affords no immunity from the diseases of its climate. A thousand strong men form this year a regiment; a year passes, and one hundred and twenty-five new recruits are required to fill up the broken column, and eight years have come and gone, and not a man of the original thousand remains in the dissolving corps." The oldest regiment in India, the Bombay rifles, stationed there since the time of Charles I, has never been able, although marriages are encouraged, to raise boys enough to supply the regiment with drummers and fliers. In the face of such facts, of which many others equally explicit might be adduced, is it not clear that a removal to a distant climate for which the constitution of the body is not adapted, is an infringement of the conditions for perfect health?

— A change of climate is often a therapeutical agent of great power. The inroads of disease frequently throw the system, so to speak, out of tune with the conditions amid which it is

placed, and a change is beneficial when it tends to restore the lost harmony. But, like all other therapeutical agents, what serves to restore the health of the sickly also destroys the health of the healthy, far more being affected in the latter than in the former way. The most influential agent of climatic conditions is heat. The relative degree of humidity, altitude, winds, and electric disturbances also have important powers over physiological action. The conditions favorable to health and life of the indigines of the poles or the north temperate zones are destructive to the indigines of the tropical, and *vice versa*. The struggle between the two does not extend beyond the third generation, the end not being in adaptation but in extermination. Now, such being the result of extreme climatic changes upon the healthy, the question arises, what is the result of changes less extreme? As the struggle is not decided by extermination, it is reasonable to suppose that it may on that account be more protracted, there being less inequality between the constructive and destructive conditions. This lack of adaptation is, in my opinion, the real cause of some diseases usually attributed to malaria, or, in other terms, they are due to our malposition in climate, and not to malaria. It does not harmonize with our knowledge of nature's operations to aver that the unfitness of external conditions to human health arises from the fault of nature. It is a well-known fact that animal and vegetable life, not interfered with by art, are almost free from disorders and disease, and that in proportion as they are put by men amid abnormal conditions do they become sickly. It is wholly owing to these artful conditions that infections and contagious diseases are originated among animals, spreading among them, under favorable circumstances, far and wide. The transposition of vegetable forms to zones for which they are not adapted is, as all know, a very common cause of sickly life in them. The mildew which attacks the English gooseberry, the rust on wheat, and the short,

sickly life of many ornamental shrubs, far removed from their native habitats, are recognized as arising from transposition to soils and climates not adapted to their healthy life. It is not assumed that nature generates a special poison destructive to their growth, thrift, and life, as it is with reference to some of the diseases which attack man. Were the causes which prove so fatal to the intertropical indigene when suddenly ~~deprived~~^{removed} to the climate of England only *localized*, there would be precisely the same grounds for believing the cause to be a malaria, as there is for supposing the cause to be a malaria which proves so fatal to the indigines of the extreme temperate when removed to an intertropical region. And, when we examine the local conditions which prove so fatal to the northern emigrant, it is found that as we approach the tropics there are local climatic conditions not found in more temperate regions. For example, the remarkable diurnal variations of heat often reaching 30°, and occurring almost every diurnal period, are never found north of 45th parallel. Nor is this local climatic peculiarity limited to its heat range; from the same cause there are great variations in atmospheric humidity, relatively dry during the heat of the day, damp and foggy during the chills of the night; and so certain forms of animal and vegetable life can maintain in such places, or in rice swamps and jungles, healthful, protracted lives. So only certain races of the human kind can live in such localities and maintain healthful, protracted lives. The insalubrious conditions are precisely the same in each case, a lack of adaptation by living amid them through a period which spans many generations. To be sure, the effects of such malpositions are very different in vegetable and lower animal life from what they are in human life. But are not the more complicated effects on the latter easily explicable by their more complicated organization and modes of living? The pith of the argument, then, is simply this: that by a removal to a climate where the

change is most extreme, a succession of disorders and speedy extermination are the results, and by removals to climates where the change is less, the struggle to maintain health and life in a natural manner is less severe and more protracted; and that some diseases, such as those ordinarily attributed to malaria, really arise from this cause or from conditions to the indigines perfectly normal, to the foreigner abnormal.

The next sanitary law is:

PURSUITS WHICH DO NOT CRAMP OR OVERSTRAIN ANY PART OF THE BODY, OR SUBJECT IT TO THE ACTION OF IRRITATING OR POISONOUS SUBSTANCES.

I cannot here enter into details on all the ways in which this law is infringed. The principles which underlie the matter I shall endeavor to set forth in a very summary manner. The increased subdivision of pursuits in recent days, while it contributes to excellence in results, undoubtedly tends to the production of disease. The special education of one sense, or of one class of muscles, necessarily implies disuse of the others. Now, we all know that training and use, to be normal, must be diversified. We see men with large hands and arms, and thin, spindling legs; we see men with large, ruddy, lithe bodies, and men with small, pale, and languid ones; in each there was cause, for development is not a thing of chance or of accident. The tailor and the shoemaker, by their inactive indoor pursuits and cramping position, interfere with the action of the organs which elaborate blood, and hence as a class are thin, pale, or tinted with a bilious hue. On the other hand, public speakers and actors strain the vocal organs, heart, and blood circulation, gymnasts the muscles, literati the brain; such exclusiveness in action of particular parts leading to disuse, atrophy, and hebetude of other parts. In this way the harmony, inherent strength, and symmetrical development of the body as a whole are subverted, causing one part to flail and die before

other parts, and so produce all the throes and agony of a violent, untimely death, or the death by disease.

Concerning the injurious effects of irritating and poisonous substances, I need not detain you, all being aware that stone-cutters, steel grinders, and workmen in lead, copper, and mercury are exceedingly liable to be carried off with diseases appropriate to their occupations.

On the eighth law of sanitation, *personal cleanliness*, the requirements are so obvious and well understood, and, having nothing to say that has not already often been said, I may properly pass to the ninth law, or

TRANQUIL STATES OF THE MIND AND ADEQUATE REST AND SLEEP.

That intellection and emotion have very important influences over the welfare of the body all students of medical science are well aware. Still it amounts in very many instances more to a theoretical recognition than a practical maxim. The correlations of the physical and mental forces are, it seems to me, not sufficiently appreciated. Without going as far as Vogt, who maintains that the brain secretes thought as the liver does bile, there are no clearly settled facts which contravene the doctrine that long continued and intense mental action drains the system at large of its energies, this not unfrequently to such an extent as to interfere with the proper performance of the functions in other parts. Not only may there be an arrest of secretion, as in the stomach, but the secretion itself may by intense emotion be greatly depraved, as in the mammary gland, and act like a poison upon the nursing child.

An over eager intensity in pursuit is, as travelers tell us, an American characteristic. Especially is this true of the residents of cities where rivalry and ambition stimulate exertion to a most intense degree. A severely worked nervous system tends to bring on various nervous derangements, to

wear out that part prematurely, and to diminish the tone and size of the organs devoted to nutrition and locomotion. We may attempt to fire up flagging tonicity by iron, strychnine, and phosphorus, but with emotion at a constant high pressure working power, with corroding care, like dry attrition, wearing away the nervous structure, the benefit must be not only transient but illusory.

By all writers upon longevity is tranquil states of the mind spoken of as one of its most common belongings. A fast life is known to be incompatible with a long one, but those whose maxim in youth is a short and sweet life, usually find, when it is too late, that the result is not only short, but sharp and bitter.

Sleep is the rejuvenation of nervous power, the winder up of mental force, which gives a good running power for the day. Unless this is gained, the whirl of molecular action in the brain is too great and prolonged; not made by an outlay of periodical accumulation, but by reserve capital. Of course the result is as disastrous vitally as such a course would be financially. Hugh Miller and Charles Dickens are noted and lamented examples of those who have made, to use an emphatic phrase, an extravagant outlay of brain power and broke it. But for one who kills himself thus, dozens so impair their energies that they linger on in torture, in incapacity, or imbecility for years. The great pity is that no timely warning voice is raised to teach men how they ought to use themselves. There are some seventy thousand of us in the United States engaged in the attempt to mend the breaks or the effects of the misuse, but scarcely one whose life is devoted to the instruction necessary to enable mankind to avoid them. I cannot believe that many in our profession do not desire to see the human family redeemed from the slough of disease into which they have sunk. Influenced by interest like others, physicians have yet, whenever clearly in their power, risen above it, and advocated strin-

gent measures for the prevention of disease. Nor should it be a matter of surprise that they have not accomplished more in this respect, for the grand current of their education and their time is so monopolized in diligent efforts to cure disease, that little leisure is found for thinking and teaching how to avoid it; besides, their efforts are usually opposed by all the ignorance, conceit, and cupidity of the community.

Moreover, in teaching men how to avoid disease, to know is one thing, to practice another. I am firmly of opinion that all disease arises from ignorance of how we ought to use ourselves, or, when we know, wilful disregard of this knowledge. All the best of our race, when they *know* any course of conduct to be wrong and fruitful in evil, will strive to avoid it, while the worst will give no heed. Disease, deformity, and untimely death are, according to this point of view, the result of ignorance and disobedience; they are nature's punishments, therefore, as well as her modes of weeding out the worst and preserving the best of our race. Let us see to it, we who are able to communicate information, that only the disobedient succumb to her inexorable laws, or only those who know and yet do not, while those who are diligent inquirers after truth and virtue may not stumble on in darkness, but be enabled so to guide their behavior as that they and their children may prosper and multiply and their days be long.

The tenth and last law is

NO INTERMARRIAGE OF NEAR BLOOD RELATIONS.

When the stock raiser wishes to increase and perpetuate qualities peculiar to a certain stock, he is careful to breed in and in. It is found that by selecting the best males and females for multiplying a certain stock, the excellencies of the progeny are intensified, though when long continued, a delicacy or tenderness of constitution is apt to arise. If human beings were as perfect in development and as free from in-

herited taints as animals usually are, the same method would undoubtedly yield the same results. But not being so, and scarcely one in ten thousand who has not inherited some taint or weakness in some particular organ or part, it arises that in and in procreation intensifies the faults or weakness just as it does the excellencies. When a husband and wife are not consanguinated, the weakness or taints in each seldom affect the same part, or in the same way; the weak lines in one may be crossed in the offspring, so to speak, by strong lines in the other; but when of the same blood, the weak in one is not crossed by the strong in the other; the taint or weakness falls upon the same part, and hence its intensification in progeny. By whatever mode it is attempted to explain the injury which results by close blood intermarriages, there can be no doubt of the fact.

Dr. Bemiss, in an elaborate paper on this subject before the American Medical Association, gives the following statistics: In 833 blood intermarriages, the total children were 3,942, of which 1,134 were defective, 883 died early, 145 deaf and dumb, 85 blind, 98 deformed, 308 idiotic, 38 insane, 60 epileptic, 300 scrofulous. Dr. Howe, in a report presented to the Legislature of Massachusetts, ascertained the parentage of 359 idiots, and one twentieth of them were the offspring of blood intermarriages; and all sorts of defects, such as deafness, insanity, etc., in about a similar ratio.

Dr. Nathan Allen, in an excellent monograph on the intermarriage of relations, gives the following facts bearing upon this point: A certain family of wealth and respectability have intermarried for many generations, until there cannot be found in the three families a sound man or woman.

Dr. Buxton, of Liverpool, states that in 170 families thus, 109 of them had each one deaf and dumb child, 38 had two such children, 17 had three, 3 had four, one family had six, another seven, and another eight.

Dr. Cadot states that out of 54 such marriages 14 were

barren, 7 produced children which died before arriving at adult age, and 18 produced scrofulous, rickety, consumptive, deaf and dumb, or idiotic children.

Many more figures of a like import might be adduced were it needful, but I take it that your minds concede the disastrous effects arising from the infringement of this law, and that our State authorities would show greater wisdom, philanthropy, and economy if they would endeavor to *prevent* the increase of these melancholy deformities of mind and body, instead of simply caring for them in our ever growing and crowded asylums. Civil law more extended than its present range concerning blood intermarriages is needed, but above all should our young men and women be well taught that such marriages may be productive of the most terrible and melancholy results to offspring of which any conception can be formed, and so serve to prevent that affliction, yea, even the thought of it, which leads to the marriage rite.

Such, in my estimate, are the laws appertaining to the preservation of health, apart from what is ordinarily understood by prophylaxis. The application of these infringements in the elucidation of the causes of disease has been necessarily brief, and more suggestive than thorough. Closely studied and minutely applied, in all their diversities and complexities, they will, it is opined, be found to cover nearly the entire field of the ultimate etiology of disease. Moreover, I regard their infringements as the essential factors in nearly every morbid process. The light their study is capable of shedding upon the causes of disease is invaluable. Medical literature, it must be acknowledged, is exceedingly meager and indefinite upon this head. Even with infection, malaria, and cold, the three grand factors, how vague are the ordinary conceptions of causes! Patrons ask, "Doctor, what is the cause of croup?" and the answer is, cold. "What is the cause of lung fever, of rheumatism, of tubercular meningitis, of bronchitis, of peritonitis?" and the answer is the

same, cold. Now, the lack of logical precision, not to speak of the absurdity of such a way of thinking, is shown by the diverse effects of a wave of cold air sweeping over a continent. Upon one, it is said to produce this disease, upon another that, but upon the greater number it produces no ill effects whatever, but just the opposite, *i. e.*, the cold air braces and invigorates. Now, a cause, in the proper meaning of the term, cannot produce opposite effects; *i. e.*, disease is one, and better health is another. The true cause of such diverse effects is within, and is produced, immediately or remotely, by a violation of one or more of the laws of health. Remove or obliterate these, and man would be as free from what is termed the bad effects of cold as the animals around us, and he would become, as he ought to become through his superior insight, the most healthy, instead of being, as he now is, the most sickly of beings.

It is well-known that man's physical condition has undergone considerable improvement within the last two hundred years. The causes of some pestilences have been destroyed, the average duration of life has been increased, the scourge of the seas is no more, and the causes of the only widespread and fearful epidemic of recent times, the Asiatic cholera, are now within our power. Budd, Parkes, Harris, and Pettenkofer admit in some German cities, in Southampton and New York, that cholera was stamped out and did not become epidemic, though the germs were imported again and again for several months, as in New York, and into a population extremely favorable to infection; so that henceforth the responsibility for the presence of Asiatic cholera must rest wholly with municipal authorities.

I might further instance the particulars of the remarkable exemption of the federal troops, in occupation of New Orleans for three years, from yellow fever, wholly due to the wise and rigid enforcement of sanitary measures, had I time, but I feel compelled to ask your indulgence to the following striking passage from Prof. Parkes:

“The history of sanitary science affords many striking instances of the removal of disease to an extent almost incredible, but no instance is more wonderful than that of the West Indies. Formerly, service in the West Indies was looked on as almost certain death. It is not fifty years since the usual time for the disappearance of a regiment of 1,000 strong was five years. Occasionally, in a single year a regiment would lose 300 men, and there occurred from time to time epochs of such fatality that it was a common opinion that some wonderful morbid power, returning in cycles of years, some wave of poison swept over the devoted islands, as sudden, as unlooked-for, and as destructive as the hurricanes which so sorely plague the

‘Golden isles set in the silver sea.’

What gave countenance to this hypothesis was, that sometimes, for months or even for a year together, there would be a period of health so great that a regiment would hardly lose a man. But another fact less noticed was not so consistent with the favorite view. In the very worst years there were some stations where the sickness was trifling, while, more wonderful still, in the worst stations, and in the worst years, there were instances of regiments remaining comparatively healthy, while their neighbors were literally decimated. And there occurred also instances of the soldiers dying by scores, while the health of the civil inhabitants in the immediate vicinity remained as usual.

“If any thing more were wanted to show the notion of an epidemic cycle to be a mere hypothesis, the recent medical history of the West Indies would prove it. At present this dreaded service has almost lost its terrors. There still occur local attacks of yellow fever, which may cause great mortality, but for these local causes may be found; and apart from these, the stations in the West Indies can now show a degree of salubrity almost equally, in some cases surpassing, that of the home service.

"The causes of the production and the reasons of the cessation of this great mortality are found to be most simple. It is precisely the same lesson which we should grow weary of learning if it were not so vital to us. The simplest conditions were the destructive agents in the West Indies. The years of the cycles of disease were the years of over-crowding, when military exigencies demanded that large garrisons should hold the island. The sanitary conditions at all times were, without exception, infamous.

"It was held to be the climate, and the climate, as in other parts of the world besides the West Indies, became the convenient excuse for pleasurable follies and agreeable vices. In order to do away with the effects of this dreaded climate, some mysterious power of acclimation was invoked. The European system required time to get accustomed, it was thought, to these climatic influences, and in order to quicken the process various measures were proposed. At one time it was the custom to bleed the men on the voyage, so that their European blood might be removed, and the fresh blood which was made might be of the kind most germane to the West Indies. At other times an attack of fever (often brought on by reckless drinking and exposure) was considered the grand preservative, and the seasoning fever was looked for with anxiety. The first statistical report of the army swept away all these fancies, and showed conclusively that instead of prolonged residence producing acclimatization and lessening disease, disease and mortality increased regularly with every year of residence.

"The progress of years has given us a different key to all these results. It is now fully recognized that in the West Indies, as elsewhere, the same customs will produce the same results. Apart from malaria, we hold our health and life almost at will." *

* Parke's Practical Hygiene, pp. 536, 538.

With the single exception of vaccination, all the sanitary triumphs of man over disease have been achieved by a better observance of some of the ten laws of health ; and, considering that there is scarcely one in ten thousand who does not violate one or more of these laws every day of his life, what may we not hope for were they all faithfully obeyed ? The eradication of taints, the abrogation of deformities, the dying the death of pure old age, euthanasia, instead of the violent law-breaker's death, the death of disease, the prevention of so much suffering, misery, and gloom, of idiocy, of insanity, of blindness, and of imbecility ; such results, grand as they are, are not any more for man to do for himself than he has done with the elements around him. He is their master, the minor ruler of the world causing his thoughts to vibrate through the mighty deep, analyzing the constituents of the sun and stars, and concentrating nature's forces within the hollow of his hand, saying to them, do this, and it is done. And yet, commander as he is over external things, he commands not himself ; regulated as he is by law in his dealings with nature, the uses he makes of himself are *lawless* ! Hence, his disasters, his sickness, his pitiable personal condition.

In the year 1864, in our two most populous cities, no less than 4,240,356 of the world's rulers lay groaning and suffering, many to die in fearful misery, and in the grossest corruption.

But a better day is dawning, a day when man will use himself by law, as he now uses the forces of nature, when he will clearly perceive that if he does not use himself according to law the results are quite as disastrous as when he attempts to use the external forces of nature, without reference to their laws ; when instead of thousands being engaged in efforts to remove effects, the thousand diseases by which he is afflicted, their main labor will be in showing how to avoid causes, and our race will then be able to grow up strong, pure,

and symmetrical in body, the uses they make of themselves ruled by reason and reason by law.

The world moves, science progresses, and man is more than ever the monarch of all he surveys. But progression cannot always move in one direction; there are limits, and in the future, as in the past, investigation will turn back, double on itself, if I may be allowed the expression, and accomplish things hardly dreamed of to-day. And I predict that in turning from the grand triumphs over outward nature, investigation will be concentrated upon man's deplorable personal condition, and carry it, in process of time, to as great triumphs over the evils by which it is assailed as investigation has now carried man's command over external nature. It is for us, as medical men, to give the first impetus, and afterwards to direct and mould this new vein of progress for the accomplishment of this beneficent end, full in faith of the observation made by that profound philosopher Descartes, that "if it be possible to perfect human nature the means must be sought in the study of medicine."

Heretofore, and even up to the present moment, the principles and practices of hygiene have been too much left to itinerant charlatans. The regular medical profession have not displayed great zeal and readiness in disseminating its truths. In the wide road over which the millions throng, physicians have too long hung upon the rear, skilfully applying balm to the wounded and relief to the distressed, instead of acting as guides and monitors to the advance, awakening thought in the giddy and headlong multitude, how they can avoid pain, disease and untimely death. The signs of a more auspicious period, a period of progress in man's personal condition, are everywhere apparent. In some of the leading medical colleges of the world, within the last decade, chairs have been organized, devoted to improvement and instruction in hygiene; the public mind is eager, nay, hungry, for hygiene knowledge, and let me ask, why the

halls devoted to the exposition of sanitary science may not in coming time be thronged by hundreds and thousands seeking to know the proper uses they can make of themselves so as to avoid pain and disease, instead of, as in the clinical departments of to-day, seeking how they can be rid of their numerous diseases and live.



